Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Rural Digital Opportunity Fund	)	WC Docket No. 19-126
	)	
Connect America Fund	)	WC Docket No. 10-90

REPLY COMMENTS OF SES AMERICOM, INC. AND O3B LIMITED

SES Americom, Inc. and its affiliate O3b Limited (together, "SES") hereby submit these reply comments regarding the above-captioned Notice of Proposed Rulemaking, which seeks input on how best to continue the work of the Connect America Fund ("CAF") Phase II auction.[1] SES and other parties concur that as the Commission considers ways to extend service to the millions of U.S. households and small businesses that remain unconnected,[2] it should adopt technology-neutral standards that enable Rural Digital Opportunity Fund ("RDOF") applicants to integrate cost-effective satellite broadband technologies into their networks. The Commission should also use this proceeding as an opportunity to refresh the current latency metrics and adopt criteria that are consistent with decisions of international standards bodies and reflect the actual requirements of real time broadband-enabled applications.

I. THE RECORD DEMONSTRATES THAT SATELLITE NETWORKS CAN PLAY A KEY ROLE IN EXPANDING BROADBAND AVAILABILITY

SES supports the Commission's proposal to adopt technology-neutral standards for RDOF-supported services.[3] However, the Commission's proposed latency standards are

[1] *Rural Digital Opportunity Fund, Connect America Fund,* Notice of Proposed Rulemaking, WC Docket Nos. 19-126 & 10-90, FCC 19-77 (rel. Aug. 2, 2019) ("NPRM").

[2] *See id.* at ¶ 3.

[3] *Id*. at ¶ 23.

unjustified and too restrictive in light of existing and evolving technologies. By failing to consider the actual network requirements for broadband services or the concrete evidence of what satellite systems can do to fulfill those needs, the Commission could impede the significant contributions that satellite technologies make to expand U.S. citizens' broadband access.

Satellite networks can meet the Commission's foundational requirement for CAF recipients: to provide "sufficiently low latency to enable use of real-time applications, such as VoIP,"[4] ensuring that residents of rural, high-cost regions have access to reasonably comparable service.[5] With round-trip latency in the range of 120-150 ms, SES's O3b Medium Earth Orbit ("MEO") satellite network delivers fiber-like connectivity to a variety of customers.[6] Just this year, SES demonstrated its ability to deliver a broad range of reliable corporate network solutions including Internet of Things, telemetry, voice over IP ("VoIP") and internet access.[7] The MEO constellation's advanced spot beam capabilities have enabled SES to provide 4G/LTE services and play a critical role in restoring service following natural disasters.[8]

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[4] *See Connect America Fund*, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663, 17698, ¶ 96 (2011) ("CAF First R&O").

[5] *Id.* at 17727, ¶ 163.

[6] *See* Comments of SES Americom, Inc. and O3b Limited, WC Docket Nos. 19-26 & 10-90, filed Sept. 20, 2019 ("SES Comments") at 3-4. Unless otherwise specified, all citations herein are to comments filed on September 20, 2019 in WC Docket Nos. 19-26 and 10-90.

[7] *Briskcom Partners with SES Networks to Offer Virtual Network Operator Services in Brazil*, https://www.ses.com/press-release/briskcom-partners-ses-networks-offer-virtual-network-operator-services-brazil (May 29, 2019).

[8] *See* SES Comments at 3 & n.6 (discussing use of O3b system to support Google's Project Loon to reestablish 4G/LTE services to Puerto Rico following hurricane Maria in 2017. *See also Delivering 4G/LTE Services*, https://www.ses.com/case-study/delivering-4glte-services (May 6, 2019) (one year after launching an SES Networks solution, customers in Iquitos, Peru who had previously received a very basic 3G solution now have the same connectivity as those in Lima, with access to social media and other life-enriching applications via a low-latency service).

Operators of next-generation geostationary orbit ("GSO") satellites also supply cost-effective, high-speed broadband to users throughout the United States and beyond.[9] Satellite operators are partnering with cloud service providers to enable remote and hard-to-reach customers to connect to cloud networks. SES, in collaboration with IBM, supports applications and solutions that can be deployed on the IBM cloud "to markets that are currently void of adequate connectivity due to either unreliable, or non-existent terrestrial networks."[10] Further, SES, Intelsat, Inmarsat and Viasat all announced partnerships with Microsoft this year to enable remote customers to connect to the Azure cloud network.[11]

Commenters pushing terrestrial-only broadband solutions simply ignore advances in satellite communications networks, such as SES's multi-orbit system, and satellite's critical role in supplying connectivity to unserved and underserved areas. For example, USTelecom asserts without justification that satellite broadband services are "not a bridge to next generation

[9] SES Comments at 3 & n.7 (the SES GSO satellite network serves customers in New York, Maryland, North Carolina, Oklahoma, California, and Alaska, and since 2017 SES has partnered with OptimERA to provide GSO C-band capacity to deliver internet connectivity to Unalaska, Alaska). *See also* Comments of Hughes Network Systems, LLC ("Hughes Comments") at 2; *Internet Access from Coast to Coast*, https://government.hughes.com/solutions/hughesnet-government (discussing Hughes' ability to provide a network that gives customers instant access to information and applications, such as email, payment transactions, web pages, sharing files, online videos, and more.). *See also* Comments of Viasat, Inc. to Innovation, Science and Economic Development Canada Notice Reference Number: SMSE-0196-18, filed Jan. 21, 2019, https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/SMSE-016-18-Viasat-comments.pdf/$FILE/SMSE-016-18-Viasat-comments.pdf at 2 (Viasat's GSO network provides broadband applications to 700,000 homes and businesses).

[10] Adrienne Harebottle, *IBM Cloud Solves Last Mile Challenges with Satellite*, Via Satellite, https://www.satellitetoday.com/mobility/2018/10/25/ibm-cloud-solves-last-mile-challenges-with-satellite/ (Oct. 25, 2018).

[11] *See* SES Comments at 4; *see also* Caleb Henry, *Satellite Industry Slowly Embracing the Cloud*, SpaceNews, https://spacenews.com/satellite-industry-slowly-embracing-the-cloud/ (Oct. 14, 2019).

broadband services."[12] But such claims are contradicted by the Commission's own findings. The Commission has highlighted the important role satellite currently plays in nationwide connectivity and emphasized that satellites will continue to develop and "deliver fast, low-latency broadband services to millions in the United States and around the world [furthering] the FCC's twin goals of closing the digital divide and promoting innovation."[13]

Satellite's role in delivering cutting-edge communications services will only grow as advanced satellite networks that have been authorized by the Commission are deployed.[14] SES's revolutionary O3b mPOWER next-generation satellite system is set to launch in 2021 and will augment SES's existing MEO assets with terabit-scale capabilities to address the massive bandwidth growth expected in 5G networks.[15] Other commenters similarly describe their upcoming next-generation satellite systems that will provide highspeed broadband services.[16]

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[12] Comments of USTelecom – The Broadband Association ("USTelecom Comments") at iii.

[13] Remarks of FCC Chairman Ajit Pai at the U.S. Chamber of Commerce Policy Roundtable on Small Satellite Integration (July 9, 2019), https://docs.fcc.gov/public/attachments/DOC-358352A1.pdf at 1. Just last month, Chairman Pai discussed the "critical role" that satellite services play in today's telecommunications industry, and the "dramatic changes in satellites' capabilities." Remarks of FCC Chairman Pai Statement at the 8th Annual Spectrum Americas Conference (September 24, 2019), https://docs.fcc.gov/public/attachments/DOC-359818A1.pdf at 2.

[14] Kim Hart, Sara Fischer, Miriam Kramer, *Satellite Broadband's Boom*, Axios https://www.axios.com/satellite-broadbands-boom-1cc21a6d-7342-4a0d-9ba9-5a2351dc4d1e.html (Oct. 15, 2019).

[15] The NPRM seeks to justify prioritizing low-latency technologies that will support 5G deployment. *See* NPRM at ¶ 25. SES's upcoming mPOWER satellite system, through its ubiquitous low latency coverage, will be important for the rollout of 5G across the U.S.

[16] *See, e.g.,* Comments of Pacific Dataport Inc. ("PDI Comments") at 6 (PDI's "Aurora HTS System," launching in 2022, will be able to provide affordable broadband service whenever needed, anywhere in Alaska, with service offerings meeting and exceeding the FCC's current baseline tier standard for broadband performance); Comments of Space Exploration Technologies Corp. ("SpaceX Comments") at 3 (SpaceX's Starlink network, a constellation consisting of almost 12,000 NGSO satellites, when fully deployed will provide broadband at competitive speeds and low latencies).

Satellite can also serve as a cost-effective middle mile solution for wireless or wireline providers, as well as redundant connection for areas prone to natural disasters that disrupt terrestrial infrastructure.

In short, satellite operators are ready, willing, and able to use their ubiquitous networks to extend the reach of cost-effective, high-speed broadband service to every corner of the United States, no matter how remote.[17] The Commission must ensure that its policies recognize and promote the capabilities of satellite networks in bridging the digital divide.

II. THE COMMENTS MAKE CLEAR THAT THE NPRM'S PROPOSED LATENCY STANDARDS ARE UNJUSTIFIED AND WOULD THWART COMMISSION OBJECTIVES

Given the importance of expanding broadband access to rural America, the Commission should promote all available and effective methods of delivering broadband to U.S. residents nationwide. Real-time applications supported by satellite networks perform comparably to those provided by terrestrial networks,[18] yet the Commission has proposed 100 ms as the latency standard with little justification or assessment.[19] This NPRM, however, provides the Commission an opportunity to take a fresh look at the latency metrics and facilitate all available and effective methods of delivering rural broadband to the U.S. public.

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[17] *See, e.g.*, Bernie Arnason, *HughesNet Begins Offering Satellite Broadband Through CAF, NY Broadband Program*, Telecompetitor https://www.telecompetitor.com/hughesnet-begins-offering-satellite-broadband-through-caf-ny-broadband-program/ (April 18, 2019) (through the New NY Broadband program, Hughes was awarded $28.3 million to bring satellite broadband to 72,163 locations across New York).

[18] *See, e.g.*, Comments of O3b Limited, GN Docket No. 16-245, filed Sept. 6, 2016, at 3 (resources cited by the Commission suggest that "a 100 ms latency threshold is not necessary for the provision of even the most latency-sensitive advanced telecommunications capabilities"); Comments of Viasat, Inc., GN Docket No. 17-199, filed Sept. 22, 2017, at 7 (the Commission lacks any "empirical basis for concluding that latency above 100 ms has an adverse impact on the end-user experience that is more significant than any of a half-dozen other performance characteristics").

[19] *See* NPRM at ¶¶ 25-26; *See also* CAF First R&O, 26 FCC Rcd at 17698, ¶ 96.

To ensure satellites can contribute to achieving the Commission's goals, any latency benchmark should reflect industry-accepted standards. For example, the International Telecommunication Union's ("ITU") Recommendation G.114, which has been cited by the Commission,[20] demonstrated that user satisfaction levels were at or above 90 percent with no significant drop-off for voice calls with a latency up to 200 ms.[21] Furthermore, both the European Telecommunications Standards Institute ("ETSI") and the 3rd Generation Partnership Project ("3GPP") have consistently placed the acceptable latency range for most real-time applications, including voice and video calling, at 150-400 ms.[22] The 100 ms threshold would unnecessarily and improperly impede the Commission's ability to ensure that consumers in rural America receive reasonably comparable service.

Given the Commission's goal of bridging the digital divide,[23] the Commission should take steps to ensure that RDOF applicants can meaningfully incorporate satellite facilities capable of providing immediate, cost-effective connectivity and supporting real-time applications.[24] This requires the Commission to take a functional approach to setting any latency

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[20] *See* CAF First R&O, 26 FCC Rcd at 17698, n.145, *citing* ITU-T, "International telephone connections and circuits – General Recommendations on the transmission quality for an entire international telephone connection," Recommendation G.114, https://www.itu.int/rec/T-REC-G.114-200305-I/en, May 2003 ("Recommendation G.114").

[21] Recommendation G.114 at 3, Figure 1/G.114.

[22] *See, e.g.*, ETSI TS 122 105 V12.1.0 (2015-01), https://www.etsi.org/deliver/etsi_ts/122100_122199/122105/12.01.00_60/ts_122105v120100p.pdf at 28-30 (specifying performance requirements for real-time conversation with an acceptable range up to 400 ms); 3GPP, Technical Specification Group Services and System Aspects Service aspects; Services and service capabilities (Release 9), 3GPP TS 22.105 V9.1.0 (2010-09), https://arib.or.jp/english/html/overview/doc/STD-T63v10_10/5_Appendix/Rel9/22/22105-910.pdf at 28-29 (same).

[23] NPRM at ¶ 12 ("Closing the digital divide and bringing robust, affordable high-speed broadband to all Americans is the Commission's top priority.").

[24] *See* Comments of SES S.A. and O3b Limited, WC Docket Nos. 18-143 *et al*., filed Jan. 26, 2018; Comments of SES S.A. and O3b Limited, PS Docket No. 17-344, filed Jan. 22, 2018;

standards, taking into account the sensitivity to delay of broadband services. As noted in the ITU study, for speech applications, customers experience service as satisfactory with latency up to 200 ms.[25] Moreover, the Commission's latency benchmark is largely rendered redundant by the Commission's separate requirement that CAF and RDOF recipients meet a "Mean Opinion Score" (MOS) of 4 or greater.[26] Therefore, it is critical that the Commission balance latency against other factors, such as "data throughput rates, coverage, availability, security, quality of service, and total cost of ownership, among others" when determining technology choices.[27]

Many of these considerations weigh heavily in favor of satellite delivery. For example, as noted by the West Virginia Broadband Council, qualitative factors, such as topography of a region, must also be considered.[28] Infrastructure build-outs for fiber, cable, DSL and wireless are too complex and costly for many rural zones outside urban and suburban areas.[29] In contrast, satellites provide nationwide coverage and require minimal infrastructure build-out, making

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Comments of SES Americom, Inc. and O3b Limited, WC Docket No. 18-213, filed Sept. 10, 2018, at 1-2; Comments of SES Americom and O3b Limited, GN Docket No. 18-238, filed Sept. 17, 2018, at 2.

[25] Recommendation G.114, Figure 1/G.114.

[26] *See* Viasat Comments at 5.

[27] *See* EMEA Satellite Operators Network, Latency in Communications Networks, https://www.esoa.net/Resources/1527-ESOA-Latency-Update-Proof4.pdf ("ESOA Report") at 2 (providing a chart identifying the latency sensitivity of a number of applications and use cases).

[28] *See* Comments of The West Virginia Broadband Enhancement Council ("West Virginia Broadband Council Comments") at 9 (stating that in West Virginia, the mountainous topography makes certain technology less reliable and therefore beneficial to end users.).

[29] *An Update on Connecting Rural America: The 2018 Microsoft Airband Initiative*, https://blogs.microsoft.com/uploads/prod/sites/5/2018/12/MSFT-Airband_InteractivePDF_Final_12.3.18.pdf. *See also* PDI Comments at 6 (Alaskan territory is "too vast, the population density too sparse, and the climate conditions too harsh" to make terrestrial solutions affordable).

satellite-delivered broadband service an extremely cost-effective deployment option for lower population density areas or locations with difficult topographies.[30]

Further, the ubiquity and reliability of satellite service are all important qualities of satellite networks that terrestrial networks sometime struggle to offer.[31] As shown through Viasat's participation in the CAF program, satellites are capable of providing connectivity where terrestrial coverage is lacking.[32] PDI also noted that satellite is the "tried and true technology that can rapidly and cost-effectively bridge the gaps in geographic areas where terrestrial networks buildout is either physically impractical or uneconomical."[33] For example, in Alaska, where 42% of the population remains unserved,[34] more than one-third of households use satellite to access the Internet.[35] In such areas, reliance on satellite networks is essential to meet demand for connectivity,[36] and the "Commission should [seek to] reduce the penalty on latency going

[30] *The advantages of satellite broadband over other terrestrial services*, Viasat (Sept. 20, 2019) https://viasat.com.mx/2018/12/05/the-advantages-of-satellite-broadband-over-other-terrestrial-services/?lang=en.

[31] As noted by FCC Chairman Ajit Pai, one of the great advantages that satellite providers have over terrestrial competitors in reaching rural and remote locations is that "the topography of the Earth doesn't matter to a satellite." *See* Shaun Waterman, *Will the Broadband Divide be Consigned to History in the US?*, Via Satellite http://interactive.satellitetoday.com/via/april-2019/will-the-broadband-divide-by-consigned-to-history-in-the-us/ (April 2019).

[32] Viasat Comments at 7.

[33] PDI Comments at 3.

[34] *Internet Access in Alaska*, Broadband Now, https://broadbandnow.com/Alaska.

[35] *A Blueprint for Alaska's Broadband Future*, A Report from the Statewide Broadband Task Force (Oct. 2014) https://www.alaska.edu/oit/bbtaskforce/docs/Statewide-Broadband-Task-Force-Report-FINAL.pdf.

[36] SES Comments at 3 & n.7.

forward to increase opportunities for coverage—and the realities of actual Internet application usage support."[37]

If the Commission supports only "the deployment of low-latency terrestrial broadband services" as suggested by Verizon,[38] millions will be left without connectivity in areas where terrestrial networks are too expensive, take too long to build out, or are simply impractical to deploy. Instead, satellite solutions should be included in any final design.[39] Further, claims by entrenched incumbent interests that latency should be the primary metric for assessing broadband performance rely on outdated generalizations about satellite services and are unsupported by any objective analysis or documentation.[40] None of these parties provides concrete data to justify a 100 ms cutoff for low latency. For example, WTA cites no evidence underlying its assertion that latency lower than 100 ms can significantly improve the clarity and definition of voice and video messages and services.[41] However, many commenters emphasize that the vast majority of critical broadband-enabled applications are not latency-sensitive, such as video downloading, web

[37] Viasat Comments at 4. *See also Connect America Fund, et al.*, Notice of Proposed Rulemaking and Further Notice of Proposed Rulemaking, 26 FCC Rcd 4554, 4601 ¶ 133 (2011) (satellite networks are "ideally suited for serving housing units that are the most expensive to reach via terrestrial technologies, because there is little marginal cost to add a subscriber").

[38] Comments of Verizon ("Verizon Comments") at 4.

[39] Alaska Broadband Task Force, https://www.alaska.edu/oit/bbtaskforce/docs/Statewide-Broadband-Task-Force-Report-FINAL.pdf.

[40] *See, e.g.*, Comments of ACA Connects – America's Communications Association at 15, n. 54; Comments of WTA – Advocates for Rural Broadband ("WTA Comments") at 16; Comments of Windstream Services, LLC ("Windstream Comments") at 12-13; USTelecom Comments at iii; Verizon Comments at 4; Comments of ADTRAN, Inc. at 8-10; Comments of NTCA–The Rural Broadband Association at 11; Comments of ITTA – The Voice of America's Broadband Providers at 19.

[41] WTA Comments at 16.

browsing, and e-mail.[42] Viasat observes that latency-sensitive applications make up less than 10 percent of Internet traffic.[43] Even Windstream acknowledges that only "some broadband uses require low latency to function as intended."[44]

In order to fulfill its objective of bridging the digital divide, the Commission must reject the unsupported claims of terrestrial interests and revise its RDOF standards to promote full participation by applicants relying on satellite technologies.

III. CONCLUSION

Enabling the inclusion of satellite connectivity in the RDOF would empower applicants to bring service to the most rural areas of the United States. SES urges the Commission to adopt technology-neutral standards without arbitrary latency requirements to ensure that RDOF applicants have the option to integrate cost-effective and high-performance satellite broadband technologies into their networks.

Respectfully submitted,

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[42] *See, e.g.,* Viasat Comments at 18; Hughes Comments at 4. ESOA characterizes television, streaming services, over-the-air updates, internet browsing, encrypted internet browsing, voice and video conferencing as applications with low to medium latency sensitivity. ESOA Report at 2.

[43] Viasat Comments at 18. *See also* Hughes Comments at 4 ("Data show that the vast majority of consumer Internet traffic consists of non-latency sensitive applications including video downloads, web browsing, and email.") (footnote omitted).

[44] Windstream Comments at 11.